

NEW RECORDS OF *RHIZOMYIA* KIEFFER (DIPTERA, CECIDOMYIIDAE) IN CHINA WITH DESCRIPTION OF TWO NEW SPECIES

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Abstract The generic diagnosis of the genus *Rhizomyia* is revised and two new species, *R. leptodicrata* sp. nov. and *R. meniscata* sp. nov. from China are described and illustrated in the present paper. The type specimens were deposited in the Institute of Entomology, College of Life Sciences, Nankai University, Tianjin, China.

Key words Diptera, Cecidomyiidae, Brachineuridi, new species, new record.

1 Introduction

Kieffer (1898) established the genus *Rhizomyia* including *Rhizomyia perplexa* Kieffer, 1898 from Moselle, France. Gagné (1994) placed *Rhizomyia* in the supertribe Brachineuridi. Since Kieffer (1898), 30 valid species of this genus have been recorded in the world (Gagné, 2010). During the course of the research on gall midges of Brachineuridi, all of *Rhizomyia* species were found the gonostylus without any modifications and the undeveloped mediobasal lobe of gonocoxite only with few setae, except *R. improbabilis* Mamaev, 1998 having hippocampus-shaped, strongly sclerotized gonostylus according to figures in Mamaev (1998) and Fedotova (2004) and *R. applanata* Fedotova & Sidorenko, 2005 having developed and sublobing mediobasal lobe according to figures in Fedotova & Sidorenko (2005). Due to the generic placement of the two species mentioned above not being able to get the consensus for all gall midge taxonomists in the world at present, we do not consider the two species among the genus *Rhizomyia* for the diagnosis and the comparison with the other congeners below.

In China, two new species, *Rhizomyia leptodicrata* sp. nov. and *Rhizomyia meniscata* sp. nov. are discovered, which are the new records of the genus *Rhizomyia* and also the supertribe Brachineuridi in China. We describe the new species and provide the photos and the illustrations of diagnostic characters in this paper.

2 Materials and Methods

Specimens of the new species were collected by Malaise traps. Adult specimens were preserved in

70 % ethanol in the field as soon as collected. For morphological observation, some of the ethanol preserved specimens were mounted on slides in Canada balsam. The morphological terminology follows Gagné (1981). The holotype and paratypes were deposited in the Institute of Entomology, College of Life Sciences, Nankai University (abbreviated as NKUM), Tianjin, China.

Figs 1 – 8 are line drawings, figs 9 – 18 are photographed by microscope and photomontaged by Auto-montage software (Helicon Focus 5.3 Pro); all the figures are based on holotype (slide numbers: NKUCecid. No. BAF001, NKUCecid. No. BAJ001) except Fig. 14 on paratype (slide number: NKUCecid. No. BAJ002).

3 Genus *Rhizomyia* Kieffer, 1898

Rhizomyia Kieffer, 1898: 56. Type species: *Rhizomyia perplexa* Kieffer (monotypy).

Cocomorpha Rübsaamen, 1899: 534. Type species: *Cocomorpha circumspinosa* Rübsaamen (monotypy).

3.1 Diagnosis

Adult. Eye bridge little constricted. Palpus (Figs 9, 14) with palpiger and 3 segments, each of last two segments longer than first one. Antenna (Figs 1, 9, 14) with 10 flagellomeres, each with prolonged neck and one basal node except for the distal one. Wing (Figs 2, 11, 16) hyaline, sparsely covered with setose and narrow scales; vein R_1 joining vein C before the half wing; vein R_5 bent a little backward, joining vein C at wing apex; vein Cu forked. Tarsal claws (Fig. 3) toothed usually on all legs; empodium approximately as long as tarsal claw. Male seventh and eighth tergites (Figs 12, 17) respectively reduced to one strongly sclerotized and linear band. Male

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This research was supported by National Natural Science Foundation of China (J1210005).

Received 13 Dec. 2012, accepted 27 Mar. 2013.

genitalia: gonocoxite (Figs 4, 6) having mediobasal lobe undeveloped with one to several setae and not having distal lobe; gonostylus usually slender, without any modifications or ventral lobes; cerci and hypoproct both emarginated deeply with a deep depression forming two lobes; aedeagus gradually tapered to apex, with or without modifications at apex. Female genitalia: ovipositor short and not protrusible; cerci separated with two short lobes.

3.2 Discussion

Fedotova & Sidorenko (2005, 2006) gave detailed generic diagnosis for head and thorax of adult. In the present paper, the diagnosis is revised to give an adequate description with the main five diagnostic characters in Brachineuridi as follows: vein R_5 bent a little backward, joining vein C distinctly at wing apex; vein Cu forked; gonostylus without any modifications or ventral lobes; gonocoxite having mediobasal lobe undeveloped with one to several setae and not having distal lobe; hypoproct emarginated deeply forming two distinct lobes.

The genus *Rhizomyia* is similar to *Effusomyia* Fedotova, *Epimyiella* Mamaev, *Stabiliola* Fedotova & Sidorenko and *Volsatiola* Fedotova & Sidorenko in Brachineuridi by the similar wing vein, but distinguishable from *Effusomyia* by gonostylus without modifications (not hippocampus-shaped), from *Epimyiella* by gonocoxite without modifications (not possessing distal lobe of gonocoxite), from *Stabiliola* by gonocoxite having mediobasal lobe undeveloped with one to several setae (not possessing one developed, longer and straight prominence of mediobasal lobe), from *Volsatiola* by hypoproct emarginated deeply forming two distinct lobes (not possessing hypoproct slightly emarginated without forming two distinct lobes).

4 Species of *Rhizomyia* in China

4.1 *Rhizomyia leptodictata* sp. nov. (Figs 1–5, 9–13)

Male. Body colour deep yellow. Body length 1.20–1.35 mm ($n = 6$). Wing length (measured from base) 1.25–1.40 mm ($n = 6$). Wing width 0.55–0.60 mm ($n = 6$).

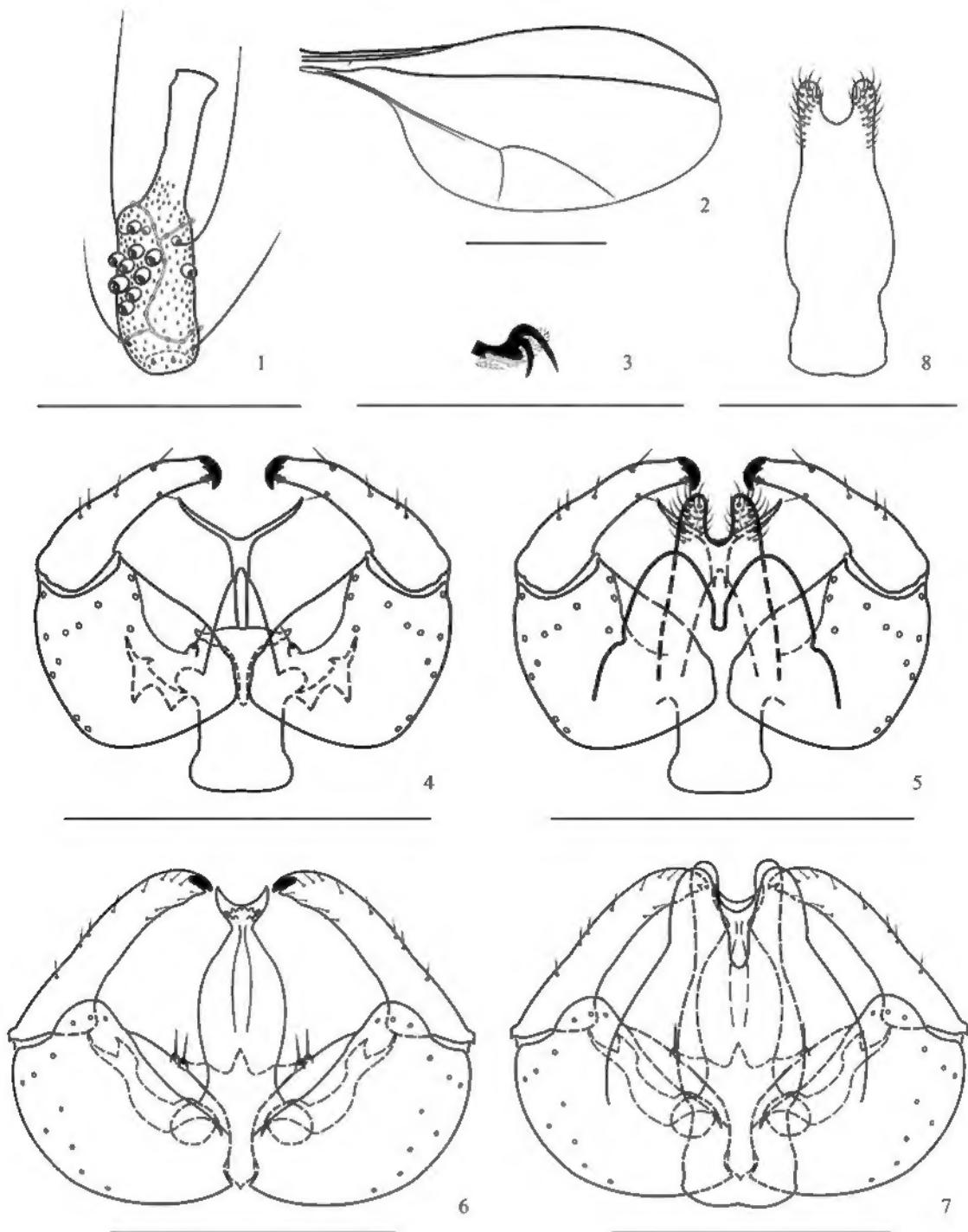
Head (Fig. 9). Eye bridge 7–8 facets long in the middle of vertex as in Fig. 9. Palpus sparsely setose, with palpiger and 3 segments, last two segments longer than first segment as in Fig. 9. Antenna with 10 flagellomeres; pedicel subglobular, smaller than scape, both densely covered with setae ventrally; node of all flagellomeres subcylindrical, a little broadened subbasally, neck of 1st through penultimate flagellomeres prolonged, much longer than half of basal node; each node with 2 horizontal,

appressed, band-shaped circumfila, subapically and subbasally respectively linked by two similar longitudinal circumfila, and 2 whorls of long, strong and irregular setae, one subbasal and one subapical; first and second flagellomeres fused; 3rd flagellomere as in Fig. 1, with the node 1.9–2.1 ($n = 6$) times as long as wide and the neck 4.5–5.0 ($n = 6$) times as long as wide, 0.88–0.90 ($n = 6$) times length of node.

Thorax (Fig. 10). Wing (Figs 2, 11) hyaline, 2.30–2.40 ($n = 6$) times as long as wide. Vein Sc weak, C, R_1 and R_5 strong; R_1 joining C at basal 2/5 of the wing; R_5 bent a little backward, joining C at wing apex; vein M_2 much weaker, almost invisible; vein Cu forked and bent backward, vein PCu approximately parallel with Cu. Legs densely covered with narrow scales and sparse setae; femur of fore-, mid- and hind-legs shorter than tibia, with proportions respectively 0.70–0.80, 0.75–0.85, 0.85–0.90 ($n = 6$) times; the second tarsus of fore-, mid- and hind-legs longer than tibia, with proportions respectively 1.10–1.20, 1.10–1.20 and 1.40–1.45 ($n = 6$) times. Tarsal claws (Fig. 3) toothed on all legs; empodium approximately as long as tarsal claw; pulvilli cylindrical, approximately 1/2 length of claw.

Abdomen (Fig. 12). Each tergite and sternite densely covered uniformly with scales. First through sixth tergites developed and strip-shaped with an irregular but mostly single, posterior row of setae; first tergite linear, much shorter than second tergite; seventh and eighth tergites (Fig. 12) respectively reduced to one strongly sclerotized, latitudinal and linear band; second through eighth sternites subrectangular covered with several scattered lateral and central setae; second sternite divided latitudinally into two bands, respectively with one single, anterior row of setae and one single, posterior row of setae; third through eighth sternites with an irregular but mostly single, posterior row of setae; seventh sternite shorter than sixth; eighth sternite shorter and much narrower than seventh.

Genitalia (Figs 4–5, 13). Gonocoxite (Fig. 4) extremely stout, having mediobasal lobe undeveloped, sclerotized and glabrous with one shorter seta; gonostylus stout and slightly arched, gradually and slightly tapering from base to apex, approximately as long as gonocoxite, covered with a few setae and dense microtrichiae, with several shorter setae located apically on the inner side, inserted with a large and strong tooth apically; cerci (Fig. 5) separated deeply with a Y-shaped depression forming two large lobes, rounded apically with a few long lateral setae; hypoproct (Fig. 5) distinctly longer than cerci, emarginated with a U-shaped depression forming two



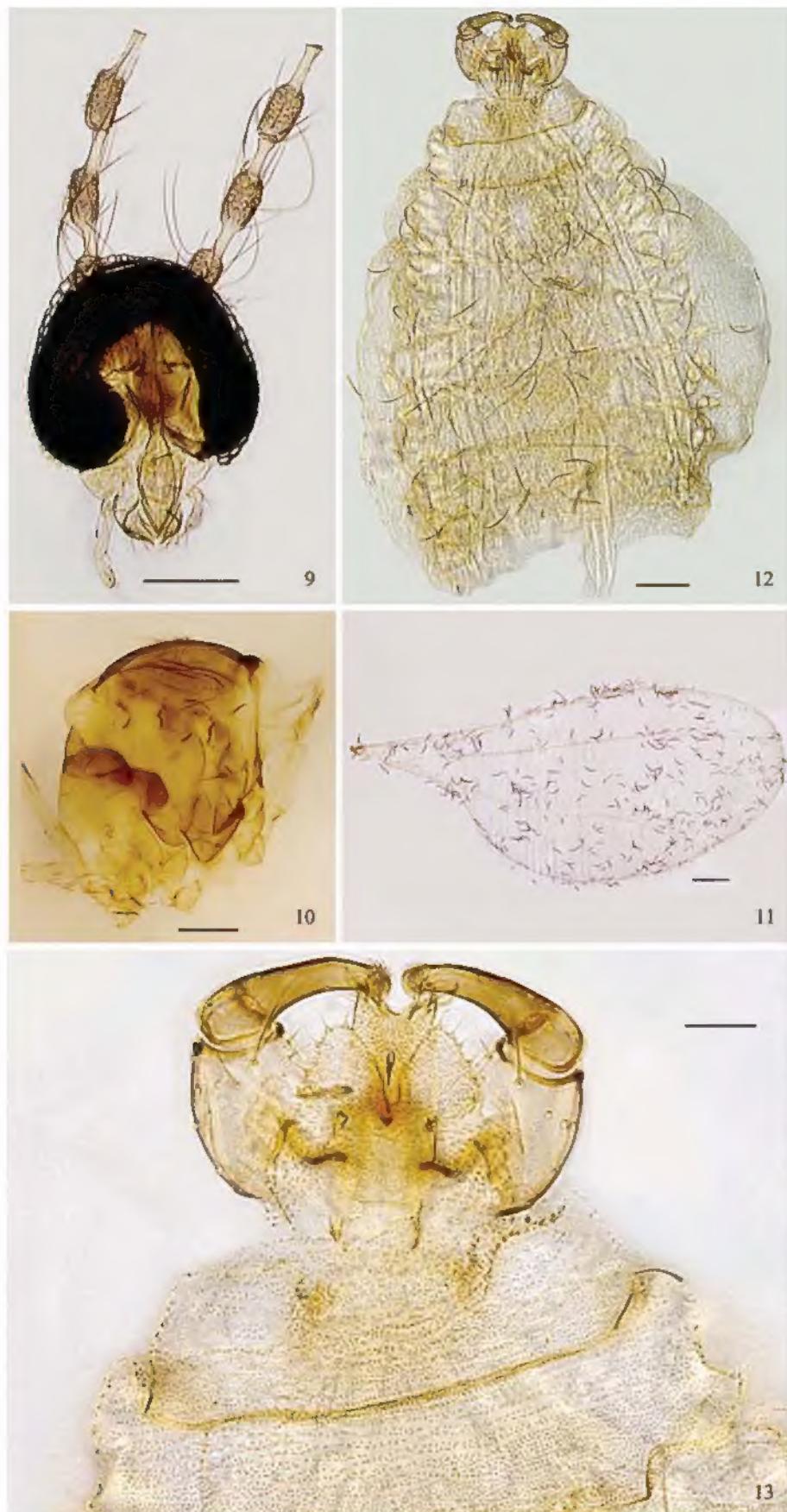
Figs 1-5. *Rhizomyia leptodictata* sp. nov., male. Figs 6-8. *Rhizomyia meniscata* sp. nov., male. 1. 3rd flagellomere. 2. Wing. 3. Fore acropod. 4, 6. Genitalia (cerci and hypoproct removed). 5, 7. Genitalia. 8. Hypoproct. 1. Ventral view. 3. Lateral view. 4-8. Dorsal view. Scale bars: 1, 3-8 = 100 μ m, 2 = 400 μ m.

distinct lobes densely covered with strong, longer and curved setae, rounded apically; aedeagus (Fig. 4) distinctly longer than gonocoxite, gradually tapered to apex except for the apex modified into a large, slender, sclerotized fork-shaped structure protruding posterodorsally, the apex of aedeagus forming a pair of prolonged and sharp prominences protruding dorsolaterally at distal half, approximately as long as

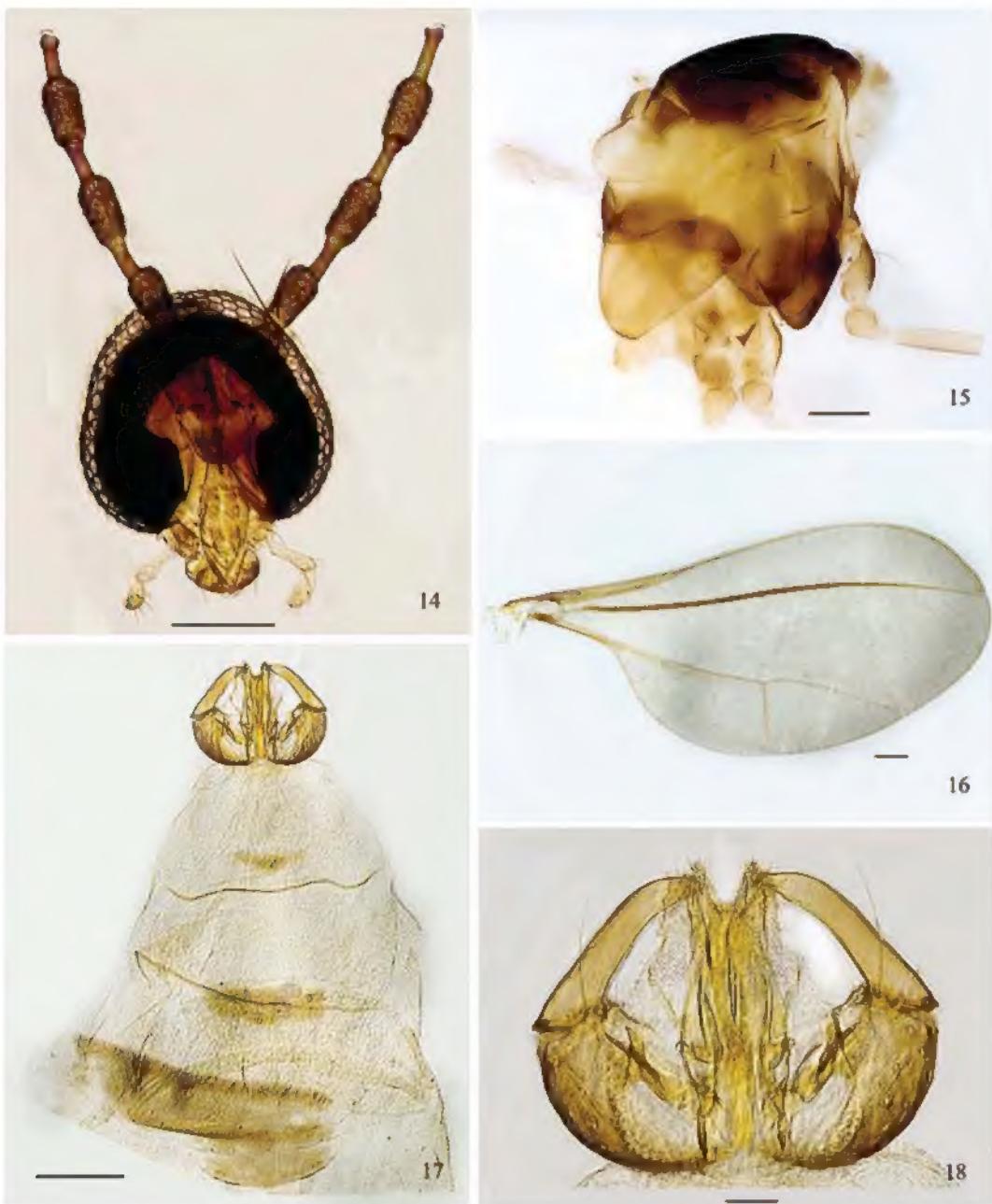
the stem.

Female. Unknown.

Holotype male, China, Yunnan, Simao (now as Pu'er), Caiyang River Nature Reserve (22.48°N, 100.58°E; alt. 1500 m), 17 May 2002, BU Wen-Jun leg., Malaise trap, NKUCecid. No. BAF001. Paratypes: 1 male, same data as holotype, NKUCecid. No. BAF002; 4 males, China, Yunnan,



Figs 9 – 13. *Rhizomyia leptodictata* sp. nov., male (photomontaged by Auto-montage Essentials software). 9. Head with 1st to 3rd flagellomeres, anterior view. 10. Thorax (lateral view, wings and legs removed). 11. Wing. 12. Abdomen, dorsal view. 13. Genitalia and abdominal segment 8, dorsal view. Scale bars: 9 – 11 = 100 μ m, 12 = 50 μ m, 13 = 20 μ m.



Figs 14–18. *Rhizomyia meniscata* sp. nov., male (photomontaged by Auto-montage Essentials software). 14. Head with 1st to 3rd flagellomeres, anterior view. 15. Thorax (lateral view, wings and legs removed). 16. Wing. 17. Genitalia and abdominal segments 6–8, dorsal view. 18. Genitalia, dorsal view. Scale bars: 14–17 = 100 μ m, 18 = 20 μ m.

Simao (now as Pu'er), Caiyang River Nature Reserve, Luoluoqinzhai Mountain (22.48° N, 100.58° E), 23 May 2002, ibid., NKUCecid. No. BAF003–006.

Distribution. China (Yunnan).

Diagnosis. *R. leptodictata* is similar to *R. meniscata* sp. nov., *R. russica* Mamaev & Zaitzev, 2002 and *R. turiformis* Fedotova & Sidorenko, 2005 by aedeagus apically with two distinct prominences, while the other *Rhizomyia* species having aedeagus slightly emarginated without forming prominences or just not emarginated.

R. leptodictata is distinguishable from the three congeners above by aedeagus apically with two slender, prolonged and sharp prominences, while *R. meniscata* having aedeagus apically with two corneous and pointed prominences, *R. russica* having aedeagus apically with two shorter and dome-shaped ones and *R. turiformis* having aedeagus apically with two forked ones.

Etymology. The specific name *leptodictata* means the apex of aedeagus modified into a slender and fork-shaped structure.

4.2 *Rhizomyia meniscata* sp. nov. (Figs 6–8, 14–18)

Male. Body colour deep yellow. Body length 1.9–2.0 mm ($n = 3$). Wing length (measured from base) 1.6–1.7 mm ($n = 3$). Wing width 0.7–0.8 mm ($n = 3$).

Head (Fig. 14). Eye bridge 8 facets long in the middle of vertex as in Fig. 14. Palpus as in Fig. 14. 3rd flagellomere as in Fig. 14, with the node 2.1–2.2 ($n = 3$) times as long as wide and the neck 3.3–4.0 ($n = 3$) times as long as wide, 0.6–0.8 ($n = 3$) times length of node. Others as *leptodicrata*.

Thorax (Fig. 15). Wing (Fig. 16) 2.2–2.3 ($n = 3$) times as long as wide. Vein Sc with one pore at basal 1/3; R_5 respectively with one pore at basal 1/5 and two smaller and closely set pores distinctly anterior to wing apex. Femur of fore-, mid- and hind-legs shorter than tibia, with proportions respectively 0.70–0.75, 0.80–0.85, 0.80–0.90 ($n = 3$) times; the second tarsus of fore-, mid- and hind-legs longer than tibia, with proportions respectively 1.2–1.3, 1.2–1.3 and 1.4–1.5 ($n = 3$) times. Others as *leptodicrata*.

Abdomen (Fig. 17). Each tergite and sternite more strongly sclerotized than *leptodicrata*. Eighth sternite crescent-shaped. Others as *leptodicrata*.

Genitalia (Figs 6–7, 18). Gonocoxite (Fig. 6) stout, having mediobasal lobe undeveloped, sclerotized and glabrous with two shorter setae; gonostylus stout and straight except for distally slightly arched, approximately as long as gonocoxite, distinctly with basal lobe, covered with a few setae and dense microtrichiae, with few shorter setae located apically on the inner side, inserted with a smaller tooth apically; cerci (Fig. 7) separated deeply and broadly with a Y-shaped depression forming two lobes, rounded apically with a few long lateral setae; hypoproct (Fig. 8) approximately as long as cerci, emarginated with a U-shaped depression forming two distinct lobes densely covered with strong, longer and curved setae, rounded apically; aedeagus (Fig. 6) distinctly longer than gonocoxite, gradually tapered to apex except for the base distinctly constricted and the apex modified into a large, crescent, shovel-shaped structure protruding distally, with a pair of corneous and pointed prominences.

Female. Unknown.

Holotype male, China, Guizhou, Fanjing Mountain (27.5°N, 108.4°E; alt. 1350 m), 29 May 2002, WANG Xin-Pu leg., Malaise trap, NKUCecid. No. BAJ001. Paratypes: 1 male, China, Hainan, Bawang Mountain (19°N, 109°E; alt. 900 m), 10 May 1988, BU Wen-Jun leg., light trap, NKUCecid. No. BAJ002; 1 male, China, Fujian, Wuyi Mountain, Tongmu, Qiliqiao (27.7°N, 117.6°E;

alt. 1 000 m), 30 Apr. 1993, BU Wen-Jun leg., NKUCecid. No. BAJ003.

Distribution. China (Guizhou, Hainan, Fujian).

Diagnosis. *R. meniscata* is characterized by the uniqueness of possessing the crescent-shaped apex of aedeagus dorsoventrally in the genus *Rhizomyia*.

Etymology. The specific name *meniscata* means the apex of aedeagus modified into a crescent-shaped structure in dorsoventral view.

Acknowledgements We thank Prof. Zoya A. Fedotova (All-Russia Institute of Plant Protection, St. Petersburg-Pushkin, Russia) for her very valuable comments on an earlier manuscript.

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中国根瘿蚊属新纪录及两新种记述（双翅目，瘿蚊科）

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摘要 对根瘿蚊属 *Rhizomyia* Kieffer 的属征进行修订，并记述采自云南、贵州、海南和福建的该属两新种，分别命名为细叉根瘿蚊 *Rhizomyia leptodictata* sp. nov. 和新月根瘿蚊 *Rhizomyia meniscata* sp. nov.。模式标本保存于南开大学昆虫标本馆。

细叉根瘿蚊，新种 *Rhizomyia leptodictata* sp. nov.（图 1~5, 9~13）

新种与分布于俄罗斯的俄根瘿蚊 *R. russica* Mamaev & Zaitzev 和塔根瘿蚊 *R. turriformis* Fedotova & Sidorenko 以及分布中国的新月根瘿蚊 *Rhizomyia meniscata* sp. nov. 在雄性成虫阳茎上的特征相似，但区别明显：新种雄性成虫阳茎端部具两个细长的尖锐突起，而 *R. russica* 雄性成虫阳茎端部具两个圆突，*R. turriformis* 雄性成虫阳茎端部具两个分叉状的突起，*R. meniscata* 雄性成虫阳茎端部具两个角状尖突。

正模♂，云南普洱（思茅）菜阳河保护区（22.48°N, 100.58°E；海拔 1500 m），2002-05-17，卜文俊马氏网捕。副

关键词 双翅目，瘿蚊科，短脉瘿蚊总族，新种，新纪录。

中图分类号 Q969.445.6

模：1 ♂，同正模；4 ♂♂，云南普洱（思茅）菜阳河保护区裸体新寨山（22.48°N, 100.58°E），2002-05-23，其它同正模。

词源：新种类名 *leptodictata* 为一阴性复合拉丁形容词，意为“细长分叉的”，指该种雄性成虫阳茎端部呈细长分叉状。

新月根瘿蚊，新种 *Rhizomyia meniscata* sp. nov.（图 6~8, 14~18）

新种与近似种区别如上。

正模♂，贵州梵净山（27.5°N, 108.4°E；海拔 1350 m），2002-05-29，王新谱马氏网捕。副模：1 ♂，海南坝王岭（19°N, 109°E；海拔 900 m），1988-05-10，卜文俊灯诱；1 ♂，福建武夷山桐木七里桥（27.7°N, 117.6°E；海拔 1000 m），1993-04-30，卜文俊捕。

词源：新种类名 *meniscata* 为一阴性拉丁形容词，意为“新月形的”，指该种雄性成虫阳茎端部背腹向呈新月形。

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